

III. Remarks

Reconsideration of this application in light of the above amendments and the following remarks is requested.

Claims 1-59 were originally filed in the present application. Claims 2-4, 27-30 and 52-54 are presently cancelled without prejudice or disclaimer, and new claims 60-69 are presently added. Consequently, claims 1, 5-26, 31-51 and 55-69 are currently pending in the present application.

Rejections under 35 U.S.C. §112: Second Paragraph

Claims 28 and 29 have been rejected under 35 U.S.C. §112, second paragraph. However, claims 28 and 29 are presently cancelled without prejudice or disclaimer, rendering their rejection moot.

Claims 23 and 48 have also been rejected under §112, second paragraph, each for including the allegedly indefinite term "high-k dielectric material." The Examiner contends that without explicit definition of this term or any other "standard for ascertaining the requisite degree," one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The Applicant respectfully traverses this rejection, based on the following.

Those having ordinary skill in the pertinent art are fully aware that high-k dielectric material is material having a dielectric constant greater than about 3.9, the dielectric constant of silicon dioxide (SiO₂). Similarly, those having ordinary skill in the pertinent art are fully aware that low-k dielectric material has a dielectric constant less than about 3.9. Thus, to those skilled in the pertinent art, the "standard for ascertaining the requisite degree" is the standard dielectric constant of silicon dioxide (SiO₂). For the Examiner's convenience, submitted with this response is an excerpt from "Semiconductor Notes," Note No. 1, posted April 15, 2003, by Jerzy Ruzyllo of Penn State University, which provides that, in Si (silicon) technology, the "high" or "low" reference is to the value of dielectric constant "k" of silicon dioxide, SiO₂, which is 3.9, such that dielectrics featuring $k > 3.9$ are referred to as high-k dielectric while dielectrics featuring $k < 3.9$ are defined as low-k dielectrics.

In view of the above, the limitation of claims 23 and 48 that the claimed insulator comprises high-k dielectric material does indeed distinctly and particularly point out the subject matter regarded as the inventions therein. Accordingly, the Applicant respectfully requests that the Examiner withdraw the rejection.

Rejections under 35 U.S.C. §102: Zhang

Claims 1-3, 7, 8, 12, 14, 18-20, 24, 25, 56 and 57 have been rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,040,589 to Zhang ("Zhang").

Claim 1

Claim 1 recites:

1. (Presently Amended) A microelectronic device, comprising:
an insulator extending over at least a portion of a substrate;
a semiconductor feature extending over at least a portion of the insulator; and
a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of the semiconductor feature, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions.

The PTO provides in MPEP §2131 that

"[t]o anticipate a claim, the reference must teach every element of the claim...."

Therefore, to sustain a §102(b) rejection with respect to claim 1, Zhang must contain all of the elements of claim 1. However, Zhang fails to disclose a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1. Consequently, a §102(b) rejection of claim 1 cannot be supported by Zhang. Therefore, the Applicant respectfully requests that the Examiner withdraw the §102(b) rejection of claim 1 and its dependent claims.

Claim 26

Claim 26 recites:

26. (Presently Amended) A transistor device, comprising:
an insulator located over a substrate;
a gate located over the insulator;
source and drain regions located over the insulator and on opposing sides of the gate; and
source and drain contacts each having a first portion connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of the source and drain regions, and wherein a portion of each of the source and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts.

To sustain a §102(b) rejection with respect to claim 26, Zhang must contain all of the elements of claim 26. However, Zhang fails to disclose source and drain contacts each having a first portion connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of source and drain regions, and wherein a portion of each of the source and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts, among other elements of claim 26. Consequently, a §102(b) rejection of claim 26 also cannot be supported by Zhang. Therefore, the Applicant respectfully requests that the Examiner withdraw the §102(b) rejection of claim 26 and its dependent claims.

Claim 51

Claim 51 recites:

51. (Presently Amended) A method of manufacturing a microelectronic device, comprising:
forming an insulator over a substrate;
forming a semiconductor feature over at least a portion of the insulator; and
forming a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of the semiconductor feature, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions.

To sustain a §102(b) rejection with respect to claim 51, Zhang must contain all of the elements of claim 51. However, Zhang fails to disclose forming a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature formed over at least a portion of an insulator that is formed over a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 51. Therefore, a §102(b) rejection of claim 51 also cannot be supported by Zhang. Accordingly, the Applicant respectfully requests that the Examiner withdraw the §102(b) rejection of claim 51 and its dependent claims.

Claim 57

Claim 57 recites:

57. (Presently Amended) An integrated circuit device, comprising:
an insulator located over a substrate;
a plurality of microelectronic devices each including:
 a semiconductor feature located over the insulator; and
 a contact layer having a first portion connecting a second
 portion and a third portion, wherein the first contact layer portion
 spans a sidewall of the semiconductor feature, and wherein a
 portion of the semiconductor feature interposes and contacts the
 second and third contact layer portions;
a plurality of dielectric layers located over the plurality of
microelectronic devices; and
a plurality of interconnects each extending through ones of the
plurality of dielectric layers, at least one of the plurality interconnects
interconnecting ones of the plurality of microelectronic devices.

To sustain a §102(b) rejection with respect to claim 57, Zhang must contain all of the elements of claim 57. However, Zhang fails to disclose a plurality of microelectronic devices each including a semiconductor feature and a contact layer, wherein each semiconductor feature is located over an insulator, wherein each contact layer has a first portion connecting a second portion and a third portion, wherein each first contact layer portion spans a sidewall of each semiconductor feature, and wherein a portion of each semiconductor feature interposes and contacts corresponding second and third contact layer portions, among other elements of claim 57. Therefore, a §102(b) rejection of claim 57 also cannot be supported by Zhang. Accordingly, the Applicant respectfully requests that the Examiner withdraw the §102(b) rejection of claim 57 and its dependent claims.

Rejections under 35 U.S.C. §103: Zhang in view of Lee

Claim 4 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang in view of U.S. Patent Application No. 2001/0023090 of Lee ("Lee"). The Applicant traverses this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claim 1 and, thus, its dependent claim 4.

As the PTO recognizes in MPEP § 2142:

... The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. If the examiner does not produce a prima facie case, the applicant is under no obligation to submit evidence of nonobviousness...

It is submitted that, in the present case, the Examiner has not factually supported a *prima facie* case of obviousness for the following, mutually exclusive, reasons.

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

Zhang and Lee cannot be applied to reject claim 1 under 35 U.S.C. §103 which provides that:

A patent may not be obtained ... if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains ... (Emphasis added)

Thus, when evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Zhang and Lee each fail to teach a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1. Thus, it is impossible to render the subject matter of any of claim 1 and its dependent claim 4 as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 4 under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Zhang and Lee cannot be applied to reject claim 1 or its dependent claim 4 under 35 U.S.C. §103.

§2142 of the MPEP also provides:

...the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made.....The examiner must put aside knowledge of the applicant's disclosure, refrain from using hindsight, and consider the subject matter claimed 'as a whole'.

Here, Zhang and Lee each fail to teach or even suggest the desirability of combination since none teach a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1. Thus, it is clear that Zhang and Lee each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection.

In this context, the MPEP further provides at §2143.01:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.

In the above context, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Zhang and Lee for the combination as applied to claim 1 or its dependent claim 4. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 4 under 35 U.S.C. §103 should be withdrawn.

Rejections under 35 U.S.C. §103: Furuta in view of Zhang and Hillenius

Claims 1, 2, 5, 6, 8-11, 13, 26-28, 30-39, 43-45, 49-52 and 54-58 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,113,234 to Furuta ("Furuta") in view of Zhang and "MOSFETs and Related Devices" by S.J. Hillenius ("Hillenius"). The Applicant traverses this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claims 1, 26, 51 and 57 and, thus, their dependent claims.

Claim 1

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Furuta, Zhang and Hillenius each fail to teach a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1. Thus, it is impossible to render the subject matter of any of claim 1 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 1 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Furuta, Zhang and Hillenius cannot be applied to reject claim 1 or its dependent claims under 35 U.S.C. §103. That is, Furuta, Zhang and Hillenius each fail to teach or even suggest the desirability of combination since none teach a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1. Thus, it is clear that Furuta, Zhang and Hillenius each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claim 1 or its dependent claims.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Furuta, Zhang and Hillenius for the combination as applied to claim 1 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of

factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 1 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

Claim 26

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Furuta, Zhang and Hillenius each fail to teach source and drain contacts each having a first portion connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of source and drain regions, and wherein a portion of each of the source and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts, among other elements of claim 26. Thus, it is impossible to render the subject matter of any of claim 26 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 26 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Furuta, Zhang and Hillenius cannot be applied to reject claim 26 or its dependent claims under 35 U.S.C. §103. That is, Furuta, Zhang and Hillenius each fail to teach or even suggest the desirability of combination since none teach source and drain contacts each having a first portion connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of source and drain regions, and wherein a portion of each of the source and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts, among other elements of claim 26. Thus, it is clear that Furuta, Zhang and Hillenius each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claim 26 or its dependent claims.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing,

suggestion, incentive or motivation in Furuta, Zhang and Hillenius for the combination as applied to claim 26 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 26 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

Claim 51

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Furuta, Zhang and Hillenius each fail to teach forming a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature formed over at least a portion of an insulator that is formed over a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 51. Thus, it is impossible to render the subject matter of any of claim 51 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 51 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Furuta, Zhang and Hillenius cannot be applied to reject claim 51 or its dependent claims under 35 U.S.C. §103. That is, Furuta, Zhang and Hillenius each fail to teach or even suggest the desirability of combination since none teach forming a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature formed over at least a portion of an insulator that is formed over a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 51. Thus, it is clear that Furuta, Zhang and Hillenius each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claim 51 or its dependent claims.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching,

suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Furuta, Zhang and Hillenius for the combination as applied to claim 51 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 51 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

Claim 57

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Furuta, Zhang and Hillenius each fail to teach a plurality of microelectronic devices each including a semiconductor feature and a contact layer, wherein each semiconductor feature is located over an insulator, wherein each contact layer has a first portion connecting a second portion and a third portion, wherein each first contact layer portion spans a sidewall of each semiconductor feature, and wherein a portion of each semiconductor feature interposes and contacts corresponding second and third contact layer portions, among other elements of claim 57. Thus, it is impossible to render the subject matter of any of claim 57 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 57 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Furuta, Zhang and Hillenius cannot be applied to reject claim 57 or its dependent claims under 35 U.S.C. §103. That is, Furuta, Zhang and Hillenius each fail to teach or even suggest the desirability of combination since none teach a plurality of microelectronic devices each including a semiconductor feature and a contact layer, wherein each semiconductor feature is located over an insulator, wherein each contact layer has a first portion connecting a second portion and a third portion, wherein each first contact layer portion spans a sidewall of each semiconductor feature, and wherein a portion of each semiconductor feature interposes and contacts corresponding second and third contact layer portions, among other elements of claim 57. Thus, it is clear that Furuta, Zhang and Hillenius each fail to provide

any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claim 57 or its dependent claims.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Furuta, Zhang and Hillenius for the combination as applied to claim 57 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 57 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

Rejections under 35 U.S.C. §103: Zhang

Claims 9-11 and 13 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang. The Applicant traverses this rejection on the grounds that Zhang is defective in establishing a *prima facie* case of obviousness with respect to claim 1 and, thus, its dependent claims.

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, since Zhang fails to teach a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1, it is impossible to render the subject matter of any of claim 1 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claims depending from claim 1 under 35 U.S.C. §103 should be withdrawn.

Rejections under 35 U.S.C. §103: Zhang in view of Morita

Claims 15-17 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang in view of WO-2002/82526 of Morita ("Morita"). The Applicant traverses this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claim 1 and, thus, its dependent claims.

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Zhang and Morita each fail to teach a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1. Thus, it is impossible to render the subject matter of any of claim 1 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claims dependent from claim 1 under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Zhang and Morita cannot be applied to reject claims dependent from claim 1 under 35 U.S.C. §103. That is, Zhang and Morita each fail to teach or even suggest the desirability of combination since none teach a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1. Thus, it is clear that Zhang and Morita each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claims depending from claim 1.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Zhang and Morita for the combination as applied to claim 1 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claims depending from claim 1 under 35 U.S.C. §103 should be withdrawn.

Rejections under 35 U.S.C. §103: Zhang in view of Asami

Claims 21-23 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang in view of U.S. Patent Application No. 2002/0014625 of Asami ("Asami"). The Applicant traverses this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claim 1 and, thus, its dependent claims.

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Zhang and Asami each fail to teach a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1. Thus, it is impossible to render the subject matter of any of claim 1 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claims dependent from claim 1 under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Zhang and Asami cannot be applied to reject claims dependent from claim 1 under 35 U.S.C. §103. That is, Zhang and Asami each fail to teach or even suggest the desirability of combination since none teach a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature extending over at least a portion of an insulator that extends over at least a portion of a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 1. Thus, it is clear that Zhang and Asami each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claims depending from claim 1.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching,

suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Zhang and Asami for the combination as applied to claim 1 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claims depending from claim 1 under 35 U.S.C. §103 should be withdrawn.

Rejections under 35 U.S.C. §103: Furuta, Zhang and Hillenius in view of Lee

Claims 29 and 53 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Furuta, Zhang and Hillenius in view of Lee. The Applicant traverses this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claims 26 and 51 and, thus, their dependent claims.

Claim 26

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Furuta, Zhang, Hillenius and Lee each fail to teach source and drain contacts each having a first portion connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of source and drain regions, and wherein a portion of each of the source and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts, among other elements of claim 26. Thus, it is impossible to render the subject matter of any of claim 26 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 26 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Furuta, Zhang, Hillenius and Lee cannot be applied to reject claim 26 or its dependent claims under 35 U.S.C. §103. That is, Furuta, Zhang, Hillenius and Lee each fail to teach or even suggest the desirability of combination since none teach source and drain contacts each having a first portion

connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of source and drain regions, and wherein a portion of each of the source and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts, among other elements of claim 26. Thus, it is clear that Furuta, Zhang, Hillenius and Lee each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claim 26 or its dependent claims.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Furuta, Zhang, Hillenius and Lee for the combination as applied to claim 26 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 26 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

Claim 51

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Furuta, Zhang, Hillenius and Lee each fail to teach forming a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature formed over at least a portion of an insulator that is formed over a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 51. Thus, it is impossible to render the subject matter of any of claim 51 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 51 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Furuta, Zhang, Hillenius and Lee cannot be applied to reject claim 51 or its dependent claims under 35 U.S.C. §103. That is, Furuta, Zhang, Hillenius and Lee each fail to teach or even suggest the desirability of combination since none teach forming a contact layer having a first portion connecting a second portion and a third portion, wherein the first contact layer portion spans a sidewall of a semiconductor feature formed over at least a portion of an insulator that is formed over a substrate, and wherein a portion of the semiconductor feature interposes and contacts the second and third contact layer portions, among other elements of claim 51. Thus, it is clear that Furuta, Zhang, Hillenius and Lee each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claim 51 or its dependent claims.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Furuta, Zhang, Hillenius and Lee for the combination as applied to claim 51 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 51 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

Rejections under 35 U.S.C. §103: Furuta, Zhang and Hillenius in view of Morita

Claims 40-42 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Furuta, Zhang and Hillenius in view of Morita. The Applicant traverses this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claim 26 and, thus, its dependent claims.

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Furuta, Zhang, Hillenius and Morita each fail to teach source and drain contacts each having a first portion connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of source and drain regions, and wherein a portion of each of the source

and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts, among other elements of claim 26. Thus, it is impossible to render the subject matter of any of claim 26 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 26 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Furuta, Zhang, Hillenius and Morita cannot be applied to reject claim 26 or its dependent claims under 35 U.S.C. §103. That is, Furuta, Zhang, Hillenius and Morita each fail to teach or even suggest the desirability of combination since none teach source and drain contacts each having a first portion connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of source and drain regions, and wherein a portion of each of the source and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts, among other elements of claim 26. Thus, it is clear that Furuta, Zhang, Hillenius and Morita each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claim 26 or its dependent claims.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Furuta, Zhang, Hillenius and Morita for the combination as applied to claim 26 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 26 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

Rejections under 35 U.S.C. §103: Furuta, Zhang and Hillenius in view of Asami

Claims 45-48 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Furuta, Zhang and Hillenius in view of Asami. The Applicant traverses this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claim 26 and, thus, its dependent claims.

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Furuta, Zhang, Hillenius and Asami each fail to teach source and drain contacts each having a first portion connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of source and drain regions, and wherein a portion of each of the source and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts, among other elements of claim 26. Thus, it is impossible to render the subject matter of any of claim 26 and its dependent claims as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 26 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

2. The Combination of References is Improper

Assuming, arguendo, that the above argument for non-obviousness doesn't apply (which is clearly not the case based on the above), there is still another mutually exclusive and compelling reason why Furuta, Zhang, Hillenius and Asami cannot be applied to reject claim 26 or its dependent claims under 35 U.S.C. §103. That is, Furuta, Zhang, Hillenius and Asami each fail to teach or even suggest the desirability of combination since none teach source and drain contacts each having a first portion connecting a second portion and a third portion, wherein the first portion spans a sidewall of a corresponding one of source and drain regions, and wherein a portion of each of the source and drain regions interposes and contacts the second and third portions of the corresponding one of the source and drain contacts, among other elements of claim 26. Thus, it is clear that Furuta, Zhang, Hillenius and Asami each fail to provide any incentive or motivation supporting the desirability of combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. §103 rejection of claim 26 or its dependent claims.

As described above, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. In the present case, it is clear that the Examiner's combination can only arise solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in Furuta, Zhang, Hillenius and Asami for the combination as applied to claim 26 or its dependent claims. Therefore, for this mutually exclusive reason, the Examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection of claim 26 and its dependent claims under 35 U.S.C. §103 should be withdrawn.

IV. Conclusion

It is clear from all of the foregoing that independent claims 1, 26, 51 and 57 are in condition for allowance. Dependent claims 5-25, 31-50, 55, 56, and 58-69 depend from and further limit independent claims 1, 26, 51 and 57 and, therefore, are allowable as well.

It is believed that all matters set forth in the Office action have been addressed. Favorable consideration and an early indication of the allowability of the claims are respectfully requested. Should the Examiner deem that an interview with Applicant's undersigned attorney would expedite consideration, the Examiner is invited to call the undersigned attorney at the telephone number indicated below.

Respectfully submitted,



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Dated: 4/15/05

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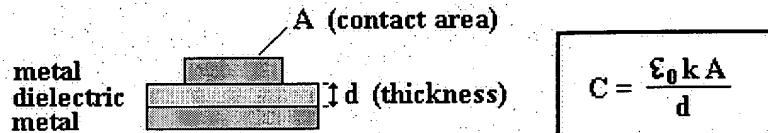
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Signature of person mailing paper and fee

High-k dielectric? Low-k dielectric?

Jerzy Ruzyllo, Penn State University

The dielectric constant, k , is a parameter defining ability of material to store charge. Consequently, it also defines capacitance, C , of any capacitor comprising of a layer of dielectric sandwiched between two metal plates. In the figure below size of the upper plate defines area of the capacitor contact (A).



All other parameters equal, k would determine capacitance of the above structure, or in other words, it would define the extent of capacitive coupling between two conducting plates – with “high”- k dielectric such coupling would be strong, and with “low”- k dielectric being obviously weak. In Si technology the reference is a value of k of silicon dioxide, SiO_2 , which is 3.9. Dielectrics featuring $k > 3.9$ are referred to as “high”- k dielectric while dielectric featuring $k < 3.9$ are defined as “low”- k dielectrics.

In cutting edge silicon nanoelectronics both high- and low- k dielectrics are needed to implement fully functional very high-density integrated circuit, although, for drastically different reasons. High- k dielectrics are needed in MOS gate stacks to maintain sufficiently high capacitance of the metal (gate)-dielectric-Si structure in MOS/CMOS transistors (Fig. 2). Due to the continued scaling of the channel length (L), and hence reduced gate area A , the need to maintain sufficient capacitance of the MOS gate stack was met by gradual decrease of the thickness of SiO_2 gate oxide (see Eq.1). Obviously such scaling

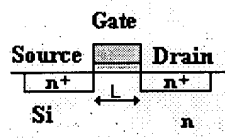


Fig. 2

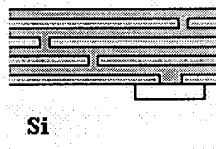


Fig. 3

cannot continue indefinitely as at certain point gate oxide will become so thin (thinner than about 1 nm) that, due to excessive tunneling current, it would stop playing role of an insulator. Hence, dielectric featuring k higher than 3.9, i.e. one assuring same capacitive coupling but at the larger physical thickness of the film, must be used instead of SiO_2 as a gate dielectric in advanced MOS/CMOS integrated circuits.

On the opposite end of the spectrum finds itself a multi-layer metallization scheme in which inter-layer-dielectric (ILD) is used to electrically insulate metal lines. In this case it is of critical importance that the capacitive coupling between adjacent interconnect lines (Fig. 3) is as limited as possible. Hence, a low- k dielectric must be used to assure as little capacitive coupling (low “cross-talk”) between interconnect lines as possible.

Whether the problem is with high- k dielectrics for MOS gates or low- k dielectrics for ILDs, lack of viable technical solutions in either of these areas will bring any future progress in mainstream silicon technology to a halt.